Contents

Preface vii

Dispersive barotropic equations for stratified mesoscale ocean dynamics
R. Camassa and D.D. Holm 1

Oceanographic inverse problems
W.C. Thacker 16

Parallel ocean general circulation modeling
R.D. Smith, J.K. Dukowicz and R.C. Malone 38

A non-linear feedback in climate modeling associated with cumulus parameterizations
C.-Y.J. Kao 62

Computations of multi-fluid flows
S.O. Unverdi and G. Tryggvason 70

A 3D adaptive mesh refinement algorithm for multimaterial gas dynamics
E.G. Puckett and J.S. Saltzman 84

High-order adaptive methods for parabolic systems
S. Adjerid, J.E. Flaherty, P.K. Moore and Y.J. Wang 94

High order finite volume approximations of differential operators on nonuniform grids
J.M. Hyman, R.J. Knapp and J.C. Scovel 112

On adaptive-grid computations of variable stars
A.N. Cox, R.G. Deupree and M. Gehmeyr 139

Plasma simulation of a Langmuir probe with normal magnetic field
R.J. Armstrong, K.-B. Liland and J. Trulsen 160

Determining finite volume elements for the 2D Navier–Stokes equations
D.A. Jones and E.S. Titi 165

An approximate inertial manifold for computing Burgers' equation
L.G. Margolin and D.A. Jones 175

Resolution of the Navier–Stokes equations in vorticity–velocity formulation via control techniques
H. Manouzi and L.S. Hou 185

Mach reflection for the two-dimensional Burgers equation
M. Brio and J.K. Hunter 194

Composite flows
B. Wendroff 208

On the numerical solution of the biharmonic equation in the plane
A. Greenbaum, L. Greengard and A. Mayo 216

Computational issues in parameter estimation and feedback control problems for partial differential equation systems
H.T. Banks 226

The optimal coefficients in Daubechies wavelets
G. Strang 239

Image compression by vector quantization of multiresolution decomposition
J.N. Bradley and C.M. Brislawn 245

Nonlinear total variation based noise removal algorithms
L.I. Rudin, S. Osher and E. Fatemi 259

Numerical solution of differential-algebraic equations in mechanical systems simulation
L.R. Petzold 269

Rational approximants and numerical methods for initial-value problems
A. Iserles 280

Symplectic Runge–Kutta and related methods: recent results
J.M. Sanz-Serna 293

Invariants and numerical methods for ODEs
C.W. Gear 303

Does variable step size ruin a symplectic integrator?
R.D. Skeel and C.W. Gear 311

Canonical methods for Hamiltonian systems: numerical experiments
D. Okunbor 314

Defect-controlled numerical methods and shadowing for chaotic differential equations
R.M. Corless 323

Algebraic calculation of stroboscopic maps of ordinary, nonlinear differential equations
R. Wackerbauer, G. Mayer-Kress and A. Hübler 335

Computing $S(\alpha)$ using symbolic Monte Carlo
I. Beichl and F. Sullivan 358

List of contributors 365

Analytic subject index 366